**Types of Reactions**

**1)** The flow diagram below shows a reaction scheme for the conversion of but-1-ene into but-2-ene.



Use the reaction scheme above to write down:

• the formula of each reagent, including any necessary conditions

• the type of reaction occurring.

**2)** Butan-1-ol can be oxidised to form a carboxylic acid.

i) Write the name or formula of a suitable reagent that could be used to carry out the reaction. Include

any specific conditions.

ii) Describe the colour change that would be observed.

iii) One of the other alcohol isomers of C4H10O can also be oxidised to form a carboxylic acid. Identify

this isomer by name or structural formula: Explain your choice of isomer.

**3)** When butanoic acid reacts with sodium hydrogen carbonate, NaHCO3, fizzing can be seen during the

reaction.

i) What type of reaction is occurring?

ii) Explain why fizzing is observed during the reaction.

iii) Complete the equation below to show the structural formula of the organic product formed.



**4)** Chloroethane, CH3CH2Cl, reacts with aqueous KOH, alcoholic KOH, and with NH3. Compare and

contrast the reactions of chloroethane with the three reagents. In your answer you should include:

• the type of reaction occurring and the reason why it is classified as that type

• the type of functional group formed

• equations showing structural formulae for reactions occurring.

**5)** For the following reaction:

• Write the structural formula of the organic product formed.

• State the type of reaction occurring. Choose from the word list: elimination or addition or oxidation

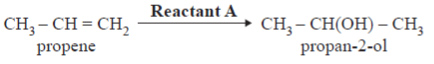
or substitution or hydrolysis or halogenation or acid-base



**6)** For each of the THREE following reactions:

• Write the name or structural formula of the reactant used.

• State the type of reaction occurring. Choose from acid-base or addition or elimination or hydrolysis or substitution

i) 

ii) 2.jpg

iii) 3.jpg

**7)** Hydrocarbons can undergo addition and substitution reactions.

Compare and contrast addition and substitution reactions. Use the reactions of ethane, CH3–CH3, and

ethene, CH2=CH2, with chlorine as your examples in your answer.

Your answer must also include:

• a description of each type of reaction

• conditions for addition and substitution reactions

• equations showing the structural formulae of the organic reactant(s) and product(s).

**8)** Give the **structural formula** of the organic product formed when:

i) Ethanol, C2H5OH, reacts with acidified potassium dichromate solution.

ii) Ethanoic acid, CH3COOH, reacts with sodium carbonate solution.

iii) One of the isomers of C4H8 can be oxidised with potassium permanganate, KMnO4, to form 2-

methylpropan-1,2-diol. Complete the following equation to show the **structural formula** of the isomer

of C4H8



iv) 2-methyl propan-1,2-diol can be further oxidised with acidified potassium dichromate, Cr2O72– / H+, to

form a compound with molecular formula C4H8O3. The compound C4H8O3 reacts with sodium carbonate

solution to form bubbles of carbon dioxide gas.

Draw the **structural formula** of the compound C4H8O3 below.



**9)** i) Write the **IUPAC name** or the **structural formula** of the product formed.

ii) State the type of reaction occurring. Choose from the following words: acid-base or addition or elimination or hydrolysis or oxidation or polymerisation or substitution

a) Ethanol is heated with a catalyst (either concentrated sulfuric acid or aluminium oxide).

b) Propanoic acid is reacted with sodium hydroxide solution.

c) Propene is reacted with hydrogen in the presence of a nickel catalyst at 150°C.

**10)** **Compare and contrast** the reactions of ethene and ethanol with acidified potassium permanganate.

For each reaction you must include:

• observations

• equations showing the structural formulae of the organic reactant and product

• type of reaction occurring.

11) Some reactions involving organic compounds can be classified as addition or elimination.

Use the examples (a) and (b) given below to clearly explain the type of reaction involved:

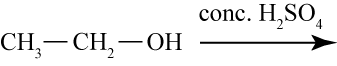
(i) complete the equation to show the main organic product formed

(ii) use the example to explain why it is classified as that type of reaction.

a) When HCl reacts with but–1–ene an addition reaction occurs.

Q3, Comp (a)(i), 90309

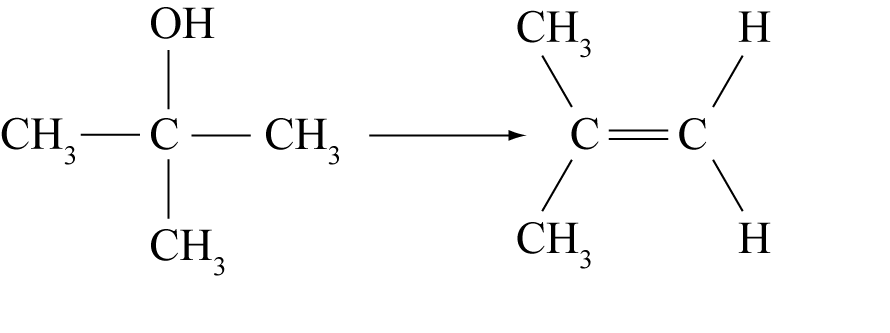
b) When ethanol is heated with concentrated sulphuric acid an elimination reaction occurs.



**12)** Complete the following reactions by writing the structural formula of each organic product.

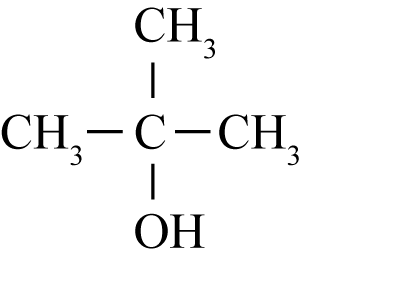
|  |  |
| --- | --- |
| a) | 90309q2a |
| b) | 90309q2b |
| c) | 90309q2c |

**13)** Methylpropene can be formed from methylpropan–2–ol. Identify a reagent that can be used to do this.

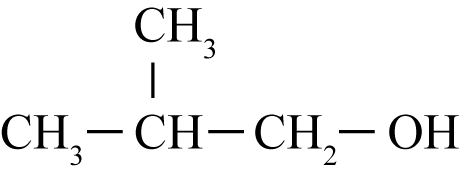


**14) a)** Complete the following equations by drawing the structural formula of the organic products

conc. H2SO4 and heat

i)  🡪

Cr2O72– /H+ and heat

(ii)  🡪

Reaction (ii)above can also be carried out using one of the reagents shown below.

**H2 / Pt conc. H2SO4 MnO4– / H+**

(b) Circle the correct reagent and describe what would be observed when this reaction occurs.

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